



Science

Free Half-Length Practice Test – FPT9



Language
English

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Science

Directions

Time – 40 minutes

25 Questions

This is a test of your skills in analyzing science information. Read each question and decide which of the four options best answers the question. Then mark your choice on your answer sheet. Sometimes several questions are based on the same material. You should carefully read this material and then answer the questions.

Work as quickly as you can without becoming careless. Do not spend too much time on any question that is difficult for you to answer. Instead, skip it and return to it later if you have time. Try to answer every question even if you have to guess.

Mark all your answers on the answer sheet. Give only one answer to each question.

If you decide to change one of your answers, be sure to erase the first mark completely.

Be sure that the number of the question you are answering matches the number of the row of answer choices you are marking on your answer sheet. The answer sheet may contain more rows than you need.

Questions 1 through 6 refer to the following information.

Cane Toads in Australia

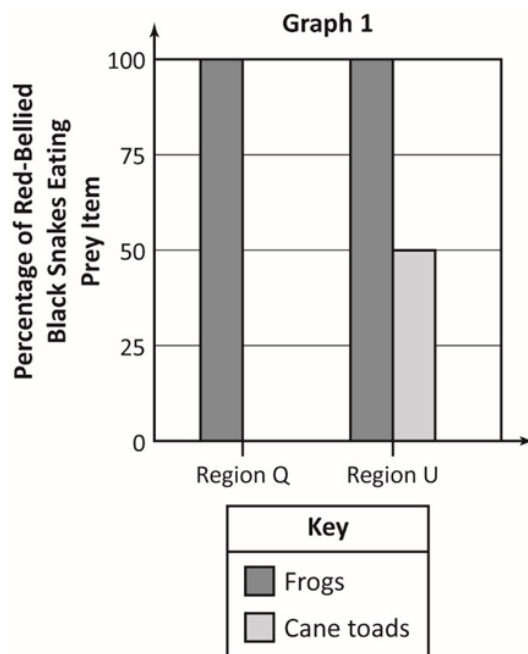
The cane toad is an invasive species that was introduced into Australia in 1935 to combat beetle infestations on sugarcane farms that had caused huge losses. The adult beetles feed on leaves of sugarcane plants, while the larvae of the beetles feed on their roots. Cane toads were released in the sugarcane farms of Queensland to control the beetles as they have large appetites and a preference for insects as a food source. Cane toads also have a venom-secreting gland on each shoulder that secretes the highly poisonous venom when threatened.

Cane Toads and Red-Bellied Black Snakes

The introduction of cane toads resulted in a sharp decline in the population of native species of snakes in Australia. One snake species that showed a sharp decline in regions dominated by cane toads was the red-bellied black snake.

An investigation was conducted to determine if the population of red-bellied black snakes had evolved to survive in regions with a cane toad population.

In experiment 1, 20 red-bellied black snakes were captured from a region that had been populated with cane toads for 40 years (region Q) and from a region unexposed to cane toads (region U). At feeding time, the snakes were offered the same number of native non-poisonous frogs and cane toads with their poisonous glands removed. Graph 1 shows the result of experiment 1.



In experiment 2, the red-bellied black snakes from regions Q and U were injected with a non-lethal dose of cane toad venom. The snakes were added to a pool, and their swimming speed pre- and post-cane toad venom injection was recorded. Table 1 shows the results of experiment 2.

Table 1

Red-Bellied Black Snake from Region	% Reduction in Swimming Speed
Region Q	18
Region U	32

The snakes of Region Q showed an 18% reduction in swimming speed, whereas those of Region U showed a 32% reduction in swimming speed.

Cane Toads and Goannas

Goannas are predatory lizards that are found in Australia. Scientists found the goanna population was less in regions with higher cane toad populations, as their venom was lethal to goannas. To conserve the population of goannas, scientists did an experiment in which they fed small, less toxic cane toads to goannas. They found that the goannas avoided consuming cane toads after the first feeding.

1 _____

Cane toads were introduced to control beetle pests in the sugarcane fields. Which factor was likely undervalued while introducing the cane toads in Australia?

- A. Cane toads have venom-secreting glands.
- B. Cane toads might not feed on beetles and their larvae.
- C. Cane toads will also become a part of the local food web.
- D. Cane toad poison might make sugarcane unfit for human consumption.

2 _____

Graph 1 shows the percentage of frogs and cane toads consumed by red-bellied black snakes from regions Q and U. Which statement could the scientists conclude from Graph 1?

- A. The red-bellied black snake of only region U avoided consuming frogs as prey.
- B. The red-bellied black snakes in regions Q and U avoided consuming frogs as prey.
- C. The red-bellied black snakes of only region Q avoided consuming cane toads as prey.
- D. The red-bellied black snakes of regions Q and U preferred consuming cane toads as prey.

3 _____

In Experiment 2, a reduction in the swimming speed of the red-bellied black snake from both regions Q and U was recorded. Which question was the experiment likely designed to answer?

- A. Are red-bellied black snakes from regions Q and U good swimmers?
- B. Do red-bellied black snakes in regions Q and U avoid consuming cane toads?
- C. Do red-bellied black snakes from Region U prefer consuming frogs over cane toads?
- D. Are red-bellied black snakes from Region Q developing resistance to cane toad poison?

4 _____

Which type of behavior is demonstrated by the goannas in the experiment where they were fed small amounts of cane toads?

- A. The avoidance of cane toads is a learned behavior in goannas.
- B. The avoidance of cane toads is an inherited behavior in goannas.
- C. The initial consumption of cane toads is an unusual behavior in goannas.
- D. The initial consumption of cane toads is a fixed action pattern in goannas.

5 _____

Scientists are searching for a long-term solution to control the cane toad population. They have designed a virus that would infect cane toad tadpoles and prevent them from growing into adults. What is likely to be one concern against using this solution to control the cane toad population?

- A. Cane toads might start feeding on the virus.
- B. The virus might mutate and infect native frogs.
- C. The solution might be difficult to implement in a large population.
- D. The virus might be ineffective when cane toads are in an aquatic environment.

Questions 6 through 11 refer to the following information.

Chemical Reactions

Researchers performed the following four laboratory investigations of chemical reactions.

Investigation 1

The researchers used tongs to hold a 10-gram ribbon of magnesium (*Mg*) metal over a flame in the presence of air until the magnesium ignited. The unbalanced reaction is represented as $Mg (s) + O_2 (g) \rightarrow MgO (s) + \text{heat}$.

Investigation 2

The researchers heated a test tube containing sulfur (*S*) and iron (*Fe*) powders in a well-ventilated area of the laboratory to produce iron (II) sulfide (*FeS*). The unbalanced reaction is represented as $Fe (s) + S_8 (s) \rightarrow FeS (s) + \text{heat}$.

Investigation 3

The researchers heated seashells made of calcium carbonate ($CaCO_3$) to produce calcium oxide (*CaO*), an odorless, gray-white solid. The unbalanced reaction is represented as $CaCO_3 (s) + \text{heat} \rightarrow CaO (s) + CO_2 (g)$.

Investigation 4

The researchers mixed two clear solutions, silver nitrate ($AgNO_3$) and sodium chloride (*NaCl*), to produce a white precipitate. The unbalanced reaction is represented as $AgNO_3 (aq) + NaCl (aq) \rightarrow AgCl (s) + NaNO_3 (aq)$.

6 _____

Which chemical equation represents the law of conservation of mass in Investigation 1?

- A. $Mg + O_2 \rightarrow 2MgO + heat$
- B. $2Mg + O_2 \rightarrow 2MgO + heat$
- C. $2Mg + 2O_2 \rightarrow 1MgO + heat$
- D. $Mg + 2O_2 \rightarrow 4MgO + heat$

7 _____

Which statement best describes the reaction that occurred during Investigation 2?

- A. The reactants combined to form a product.
- B. The reactants absorbed heat to form a product.
- C. The reactants formed two different metals.
- D. The reactants separated into individual atoms.

8 _____

Which statement best describes the type of reaction that occurred in Investigation 3?

- A. The decomposition of calcium carbonate was an endothermic reaction.
- B. The decomposition of calcium carbonate was an exothermic reaction.
- C. The synthesis of calcium carbonate was an endothermic reaction.
- D. The synthesis of calcium carbonate was an exothermic reaction.

9 _____

Which type of reaction characterizes the reaction between silver nitrate and sodium chloride in Investigation 4?

- A. Combustion
- B. Decomposition
- C. Single-replacement
- D. Double-replacement

10 _____

Which investigation represents both a combustion and a synthesis reaction?

- A. Investigation 1
- B. Investigation 2
- C. Investigation 3
- D. Investigation 4

11 _____

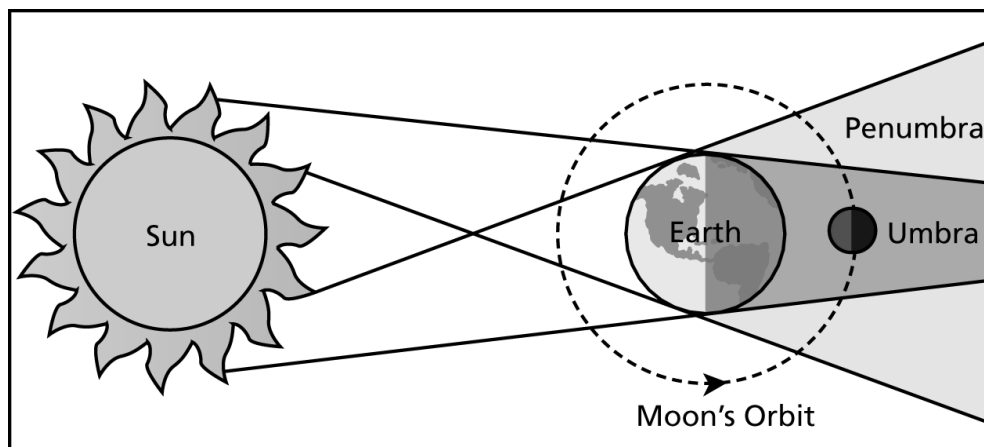
All four investigations support the law of conservation of mass because in each investigation

- A. heat was either applied or produced.
- B. phase changes occurred during the reaction.
- C. the number of atoms on each side of the reaction equation should be equal.
- D. the combined volume of the reactants was the same as that of the products.

Questions 12 through 15 refer to the following information.

Lunar Eclipse

A lunar eclipse occurs when a full Moon passes through some portion of Earth's shadow. In the penumbra, the outer region of the shadow, some direct sunlight reaches the Moon. In the umbra, the inner region of the shadow, Earth prevents all direct sunlight from reaching the Moon. When the entire Moon is in Earth's umbral shadow, the lunar eclipse is total.



Information about six total lunar eclipses seen at the same location on different dates is presented in the following table. The time of day is divided into 24 hours. One day is from midnight to the following midnight. The Moon's altitude in degrees is the angle of the Moon relative to the horizon.

Date	Beginning of Total Lunar Eclipse		Middle of Total Lunar Eclipse		End of Total Lunar Eclipse	
	Time of Day	Moon's Altitude (in degrees)	Time of Day	Moon's Altitude (in degrees)	Time of Day	Moon's Altitude (in degrees)
1	23:19	+56	00:03	+56	00:48	+53
2	22:55	+60	01:47	+55	02:36	+47
3	06:09	-15	07:00	-24	07:51	-33
4	02:14	+50	02:55	+43	03:35	+36
5	23:09	+26	23:34	+26	23:59	+26
6	17:55	+16	18:21	+20	18:46	+25

12 _____

On which of these dates and times was the altitude of the Moon the highest?

- A. Date 1 at 23:19
- B. Date 1 at 00:03
- C. Date 2 at 22:55
- D. Date 2 at 01:47

13 _____

From where on Earth is a total lunar eclipse visible, if at all?

- A. From the day side only
- B. From the night side only
- C. From either the day or the night side
- D. From neither the day nor the night side

14 _____

On which date did the total lunar eclipse begin and end within the hour before midnight?

- A. Date 1
- B. Date 2
- C. Date 5
- D. Date 6

15 _____

The six total eclipses listed in the table occurred during a four-year period.

Which statement about these eclipses is true?

- A. Only one eclipse occurred in each of the four years.
- B. Two eclipses occurred in each of the four years.
- C. More than one eclipse occurred in at least one of the four years.
- D. More than two eclipses occurred in at least two of the four years.

Questions 16 through 19 refer to the following information.

Texas Wild Rice

Texas wild rice is an aquatic grass that is found only along a small segment of the San Marcos River in central Texas. Texas wild rice grows between 0.3 and 2.0 meters below the water surface, in clear water near the middle of the stream. When Texas wild rice grows in still, shallow water, it flowers and disperses seeds through the air. However, when Texas wild rice grows in deeper, swifter water, it reproduces vegetatively by rooting at the stem nodes. Having two reproductive strategies is a good plan for living in a constantly changing environment, such as a spring-fed river in a semiarid urban habitat.

Texas wild rice is an endangered species. It is threatened by human activities, such as swimming, canoeing, and tubing. Texas wild rice is also threatened by invasive species, such as nutria, a large rodent that lives in the wetlands, and by the aquatic giant ramshorn snail, both of which feed on the roots of the plants. The plants are also subject to fluctuations in river volume. Floods can uproot the plants or strip off leaves and flowers, and low river flow due to drought can expose the plants to air, causing them to dry out or be consumed by herbivores.

16 _____

Which function is performed by the Texas wild rice flowers that extend above the surface of the water?

- A.** Attracting herbivore predators
- B.** Exchanging gas during cellular respiration
- C.** Achieving pollination via wind for reproduction
- D.** Increasing photosynthesis during sunny months

17 _____

Which table classifies the type of reproduction and cell division for each reproductive strategy of Texas wild rice?

A.

Reproductive Strategy

	Seed	Stem Nodes
Type of Reproduction	Sexual	Asexual
Type of Cell Division	Meiosis	Mitosis

B.

Reproductive Strategy

	Seed	Stem Nodes
Type of Reproduction	Sexual	Asexual
Type of Cell Division	Mitosis	Meiosis

C.

Reproductive Strategy

	Seed	Stem Nodes
Type of Reproduction	Asexual	Sexual
Type of Cell Division	Mitosis	Meiosis

D.

Reproductive Strategy

	Seed	Stem Nodes
Type of Reproduction	Asexual	Sexual
Type of Cell Division	Meiosis	Mitosis

18 _____

In an investigation to determine if Texas wild rice can be successful in other locations, researchers performed an experiment to monitor the photosynthetic activity of Texas wild rice at varying water depths. Which of these was most likely the dependent variable in this experiment?

- A. Amount of dirt in the water at each depth
- B. Amount of glucose produced at each depth
- C. Water temperature at each depth
- D. Water current at each depth

19 _____

Texas wild rice plants typically have short, spongy roots. Which statement best describes an advantage of the Texas wild rice roots in their stream habitat?

- A. They produce the flower structures.
- B. They provide a site for photosynthesis.
- C. They anchor the plant to the streambed.
- D. They tunnel to the water sources deep underground.

20 _____

After noticing that plants near a factory grow more slowly, a researcher proposes that airborne pollutants from the factory are interfering with photosynthesis in nearby vegetation.

The underlined part of this sentence is best described as

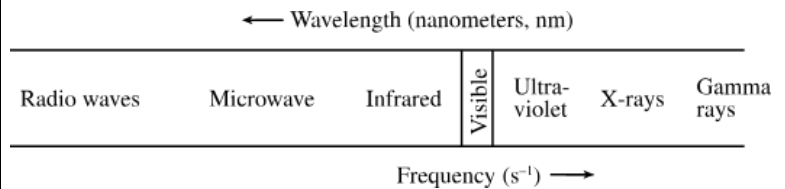
- A. a theory.
- B. a hypothesis.
- C. an observation.
- D. an assumption.

21 _____

Which structure is present in both viruses and cells?

- A. Nucleus
- B. Chloroplast
- C. Mitochondrion
- D. Genetic material

22 _____



Which of these electromagnetic waves has the longest wavelength and the lowest frequency?

- A. Radio waves
- B. Microwaves
- C. X-rays
- D. Gamma rays

23 _____

Why does a sample of solid H_2O have a larger volume than a sample of liquid H_2O of the same mass?

- A. Solid H_2O has a greater molar mass than liquid H_2O .
- B. Solid H_2O has a higher specific heat than liquid H_2O does.
- C. Solid H_2O has weaker hydrogen bonds than liquid H_2O does.
- D. Solid H_2O has a crystal structure that is more open than the structure of liquid H_2O .

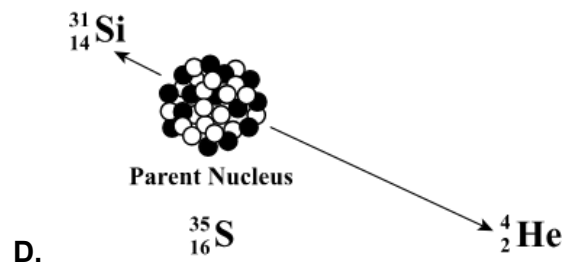
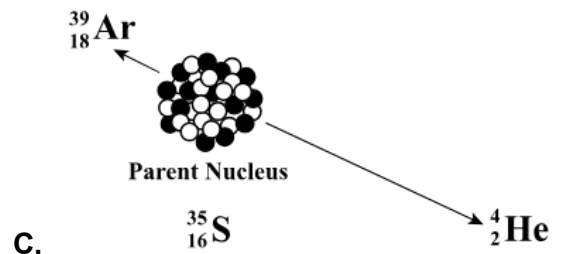
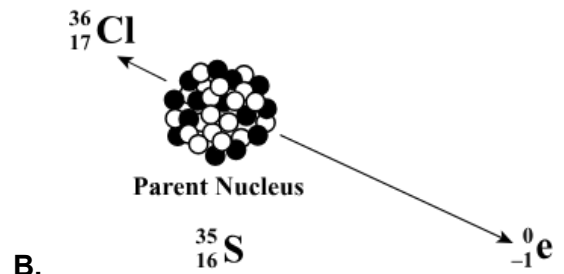
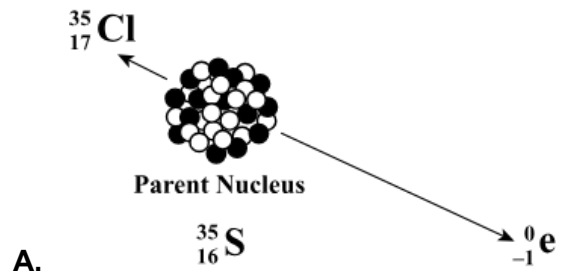
24

Which pair of terms describes the products of photosynthesis?

- A. Glucose and oxygen
- B. Glucose and nitrogen
- C. Carbon dioxide and oxygen
- D. Carbon dioxide and nitrogen

25

Radioactive decay is the spontaneous breakdown of an atomic nucleus, resulting in the release of energy and matter from the nucleus. Beta decay is a type of radioactive decay in which a proton is transformed into a neutron or a neutron is transformed into a proton. Which diagram represents the beta decay of sulfur-35?



HiSET Answer Key and Rationales

Sequence Number	Correct Response	Content Category	Question Difficulty
1	C	I. Life Science	Easy
Rationale			
<p>Option C is correct because the cane toad was introduced to feed on beetles. Therefore, it follows that they will become a part of the food web, which includes beetles and other organisms that cane toads might feed on.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
2	C	I. Life Science	Medium
Rationale			
<p>Option C is correct because the graph shows that red-bellied black snakes of Region Q only ate frogs.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
3	D	I. Life Science	Medium
Rationale			
<p>Option D is correct because the results of the experiment show that the swimming speed of red-bellied black snakes in region Q had reduced by a lower percentage than that of the snakes in region U, providing evidence that snakes in region Q that had been exposed to the cane toads in the past had developed some resistance.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
4	A	I. Life Science	Easy
Rationale			
<p>Option A is correct because the experiment showed that goannas were able to learn from the experience of consuming small, less toxic cane toads and would avoid them thereafter.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
5	B	I. Life Science	Easy
Rationale			
Option B is correct because cane toads and frogs are very closely related, and there is a high chance that the virus could mutate and infect the native frogs.			

Sequence Number	Correct Response	Content Category	Question Difficulty
6	B	II. Physical Science	Medium
Rationale			
Option B is correct because it is the only equation in which the individual elements are balanced on the reactants and product sides of the equation.			

Sequence Number	Correct Response	Content Category	Question Difficulty
7	A	II. Physical Science	Medium/Easy
Rationale			
Option A is correct because, as the passage reads, the elements sulfur and iron react to form a single product, iron sulfide (FeS).			

Sequence Number	Correct Response	Content Category	Question Difficulty
8	A	II. Physical Science	Hard
Rationale			
Option A is correct because by looking at the formulas involved, one would deduce that calcium carbonate $CaCO_3$ has broken down to form a smaller compound. Since the heat is on the reactant side of the equation, it is endothermic, meaning that energy had to be put into the reaction system for the reaction to be able to proceed.			

Sequence Number	Correct Response	Content Category	Question Difficulty
9	D	II. Physical Science	Medium
Rationale			
<p>Option D is correct because this is a double-replacement reaction, in which <i>Ag</i> and <i>Na</i> switch their bond partners. On the reactant side, <i>Ag</i> is paired with <i>N</i>, and <i>Na</i> is paired with <i>Cl</i>. On the product side, <i>Ag</i> is with <i>Cl</i>, and <i>Na</i> now with <i>N</i>.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
10	A	II. Physical Science	Hard
Rationale			
<p>Option A is correct because combustion reactions typically involve a substance reacting with oxygen to release heat. In this case, magnesium reacts with oxygen in the air to form magnesium oxide, producing heat. Investigation 1 most closely mirrors a combustion reaction because it releases heat and contains oxygen (O_2) as a reactant.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
11	C	II. Physical Science	Medium
Rationale			
<p>Option C is correct because the law of conservation of mass involves the preservation of balance amongst the individual atoms in the reaction system.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
12	C	III. Earth Science	Easy
Rationale			
<p>Option C is correct because on Date 2 at 22:55 the altitude will be $+60^\circ$, which is the highest altitude of the Moon in the table.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
13	B	III. Earth Science	Hard
Rationale			
Option B is correct because a total lunar eclipse happens when the Earth comes between the Sun and the Moon, and the Moon passes into Earth's umbra. To see the Moon, it must be above the horizon, which only happens on the night side of Earth.			

Sequence Number	Correct Response	Content Category	Question Difficulty
14	C	III. Earth Science	Medium
Rationale			
Option C is correct because the total lunar eclipse on Date 5 began at 23:09 and ended at 23:59, entirely within the hour before midnight.			

Sequence Number	Correct Response	Content Category	Question Difficulty
15	C	III. Earth Science	Hard
Rationale			
Option C is correct because more than one eclipse must have occurred in at least one of the four years in order to have six total eclipses in four years.			

Sequence Number	Correct Response	Content Category	Question Difficulty
16	C	I. Life Science	Easy
Rationale			
Option C is correct because the passage states that Texas wild rice flowers and disperses seeds through the air in shallow water.			

Sequence Number	Correct Response	Content Category	Question Difficulty
17	A	I. Life Science	Medium
Rationale			
Option A is correct because seed dispersal is a form of sexual reproduction, which involves meiosis, and stem nodes are a form of asexual reproduction that involves mitosis.			

Sequence Number	Correct Response	Content Category	Question Difficulty
18	B	I. Life Science	Hard
Rationale			
Option B is correct because the dependent variable is the outcome that is being measured in an experiment. The amount of glucose being produced is a possible outcome in the experiment that could be measured.			

Sequence Number	Correct Response	Content Category	Question Difficulty
19	C	I. Life Science	Easy
Rationale			
Option C is correct because one purpose of plant roots is to anchor the plant in the soil.			

Sequence Number	Correct Response	Content Category	Question Difficulty
20	B	I. Life Science	Hard
Rationale			
Option B is correct because a hypothesis is a proposed, testable explanation. The first part of the sentence, "plants near the factory grow more slowly," is an observation, whereas the second and underlined part of the sentence is a hypothesis.			

Sequence Number	Correct Response	Content Category	Question Difficulty
21	D	I. Life Science	Medium
Rationale			
<p>Option D is correct because viruses are not cells and therefore lack organelles. However, both viruses and cells contain genetic material.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
22	A	II. Physical Science	Medium
Rationale			
<p>Option A is correct because frequency and wavelength have an inverse relationship, which means as one increases, the other decreases. According to the graphic, radio waves have the longest wavelength and therefore the lowest frequency.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
23	D	II. Physical Science	Hard
Rationale			
<p>Option D is correct because water is a chemical that displays a set of unique properties, with one being that water molecules form a rigid, crystalline structure held by hydrogen bonds that are locked into a stable hexagonal pattern, pushing the molecules farther apart than when in liquid form.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
24	A	I. Life Science	Easy
Rationale			
<p>Option A is correct because the products of photosynthesis are glucose and oxygen.</p>			

Sequence Number	Correct Response	Content Category	Question Difficulty
25	A	II. Physical Science	Hard
Rationale			
<p>Option A is correct because in beta decay of sulfur, one neutron changes into a proton. After this, the atom has one more proton than it previously did, which means it becomes chlorine. Option A's diagram is the only one in which the mass number of 35 (in the top left corner by <i>C</i>) stays the same due to the law of conservation, but the atomic number changes to 17 because it now has 17 protons instead of 16.</p>			